STUDIES IN THE APOCYNACEAE. II[1]

A Revision of the Genus Stemmadenia

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Historical Review

The Apocynaceous genus *Stemmadenia* was established in 1844 by Bentham,[2] who recognized three species, the type, *S. glabra*, *S. pubescens*, and *S. mollis*. The first and third species were entirely new to science, but the second Bentham perceived to be identical with *Bignonia ? obovata* Hook. & Arn.,[3] although he chose to give the species an original name. The specific adjective of Hooker and Arnott has subsequently been restored by Schumann.[4]

In 1853, A. Richard,[5] evidently unaware of Bentham's genus, published the genus *Odontostigma*, with one species, *O. Galeottiana*, from the environs of Havana, Cuba. From the evidence of an excellent plate which illustrates Richard's genus, Miers,[6] in 1878, was able to definitely identify *Odontostigma* as representing merely another element of *Stemmadenia*.

Thirty-four years after the establishment of the genus by Bentham, Miers[7] presented a treatment of *Stemmadenia* in his monograph of the South American Apocynaceae. In the treatment of Miers, besides the three species of Bentham, five new

[1] Studies in the Apocynaceae. I, containing an historical account of the taxonomy of the family and a critical study of the tribe Apocyneae, is in manuscript, and will appear in a subsequent number of the Annals of the Missouri Botanical Garden.

[2] Benth. Bot. Voy. Sulph. 124. *t. 44*. 1844.

[3] Hook. & Arn. Bot. Beechey's Voy. 439. 1841. Concerning the mistake of the *Stemmadenia* for a *Bignonia*, Bentham wrote: "A portion of the seed vessel and seeds of a *Pithecoctenium*, probably *P. muricatum*, had been by mistake laid by Dr. Sinclair into the same sheet with the specimen of this plant, and had misled the authors of the 'Botany of Captain Beechey's Voyage' and induced them to refer the plant doubtfully to *Bignonia*." Benth., *l. c.* 125. 1844.

[4] K. Sch. in Engl. & Prantl, Nat. Pflanzenfam. **4**[2]: 149. 1895.

[5] A. Rich. in Sagra, Hist. Cub. **11**: 868. *t. 56*. 1853.

[6] Miers, Apoc. S. Am. 76. 1878.

[7] *l. c.* 74–77. 1878.

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species are added to the genus, namely, *S. grandiflora* (*Tabernaemontana grandiflora* Jacq.), *S. insignis*, *S. Galeottiana* (*Odontostigma Galeottiana* A. Rich.), *S. bella*, and *S. bignoniaeflora* (*Echites bignoniaeflora* Schl.). Of these, the most important by all means is *S. grandiflora*, which introduced a very distinct element into the genus and which, in this revision, is considered to merit subgeneric distinction.

The work of Miers, which was the last to review the genus, was largely but a compilation of the descriptions of plants which the author himself had never seen, and since he had been able to examine only three of the eight species which he recognized, his product is liable to frequent errors, to obviate which will be in part the duty of this revision.

Since the treatment of Miers, several species have been added to the genus, and explorative activity in Central and South America has greatly augmented representatives of the genus in herbaria. In the course of recent determinative work on miscellaneous American Apocynaceae, an encounter with the technical and nomenclatoral difficulties of *Stemmadenia* has convinced the author that a revision of the genus might appropriately be introduced into this series of Studies in the Apocynaceae.

The study entailed in the preparation of this revision was begun at the Gray Herbarium of Harvard University and completed at the herbarium of the Missouri Botanical Garden. The author desires to express his appreciation to Dr. B. L. Robinson and to Dr. J. M. Greenman for assistance and suggestions during the course of the study, and to Dr. George T. Moore for the privileges of the Missouri Botanical Garden. He is also indebted to Dr. N. L. Britton and Mr. Percy Wilson, of the New York Botanical Garden, Dr. F. W. Pennell, of the Philadelphia Academy of Natural Sciences, Dr. W. R. Maxon and Mr. E. P. Killip, of the United States National Herbarium, and to Mr. P. C. Standley and Mr. J. F. Macbride, of the Field Museum, for the courtesy of study in the various herbaria.

GENERAL MORPHOLOGY

The various species of *Stemmadenia* are shrubs or small trees attaining a height of two to twelve meters.

Leaves.—The leaves of the genus are opposite, membranaceous, entire, penninerved, glabrous or pubescent, and petiolate. The sheaths of the petioles are conspicuous, meeting in a shallow ring about the stem. Numerous fusiform glands are concealed in the petiolar ring of the leaves, but are fully exposed and persistent when the leaf drops from the stem. The presence of these glands has been overlooked by each previous student of the genus.

The outline of the leaf varies little, the most frequent form being ovate-oblong. However, variations occur in the spathulate leaves of *S. Donnell-Smithii* and the lanceolate leaves of *S. eubracteata*. The surface of the leaves is extremely variable, and may grade upon the same specimen of certain species from tomentose, through barbate, to glabrous. In the case of other species, however, the surface of the leaves is relatively constant.

The length of the petiole appears of some constancy, and is occasionally used as an accompanying taxonomic criterion.

Inflorescence.—The inflorescence is a reduced terminal cyme, bearing from one to several flowers usually, and three inconspicuous bracts upon the pedicel of each flower. The ordinary well-developed inflorescence of the majority of species of the genus produces four to ten flowers, but an exception is found in the case of *S. pauciflora* which normally develop but one flower for each cyme, although one to several abortive buds may appear.

The bracts usually directly subtend the flower, but in certain species, as in *S. eubracteata*, may appear about midway upon the pedicel. The character of the bract is a differentiating criterion between the genera *Tabernaemontana* and *Stemmadenia*, since in the former genus the bract always subtends the pedicel or aborts entirely.

Calyx.—The calyx consists of five imbricate lobes of unequal size, the three interior being somewhat larger, and usually more nearly colorless than the two smaller exterior lobes. Upon the interior of the calyx-tube, near the attachment to the disc, are borne several cycles of small fusiform glands, which may vary in approximate number from fifty to over one hundred. The unequal lobes of the calyx and the unusual number of the calycine glands are obvious distinguishing marks of the genus.

The relative length of the calyx-lobes and the general size of the calyx are of basic importance in the speciation of the genus, and form at once an evident, and it is believed a reliable and natural, taxonomic criterion. The lobes may vary from 2 cm. in some species to 1 mm. long in others, and are usually distinct for the various species.

Corolla.—The genus *Stemmadenia* is at once divisible into two subgenera largely upon the basis of the form of the corolla. The sections are also based upon this character. The corolla is salverform in the subgenus *Ochrodaphne*, and infundibuliform in the subgenus *Eustemmadenia*. The salverform corollas of *Ochrodaphne* are fairly regular, but the infundibuliform corollas of *Eustemmadenia* divide into two series, namely, that of the section *obovatae*, with a conical proper-throat and a spirally twisted tube, and that of the section *Galeottiae*, with a cylindrical proper-throat and a tube without spiral twisting. The relation of the proper-throat to the proper-tube of the infundibuliform corollas is again apparently a matter of taxonomic importance in the case of certain species, as is also the length of the limb.

Within the corolla-tube, above and opposite the attachment of the stamens, are five conspicuous appendiculate folds which vary considerably in length, but are constant for the genus.

The corollas are large and showy, and are either yellow or yellowish white in color. The five equal lobes of the limb are dextrorsely deflexed, especially in the subgenus *Ochrodaphne*.

Stamens.—The five stamens are wholly inserted, and are attached to the corolla-tube by short, thick, unguiculate filaments. The two sporangia comprising the anthers are elongate-fusiform in shape, and may be practically parallel, as in the subgenus *Ochrodaphne*, or obviously divergent at the base of the anther, as in the subgenus *Eustemmadenia*. The anthers are entirely fertile and unappendaged.

Pistil.—The pistil is typically bi-carpellate. The carpels are sessile and are separate except at the apices, which connive to form the filamentous style. Each carpel is uniloculate and contains many ovules upon a binate ventral placenta. The stigma is borne upon a fleshy terminal clavuncle.

Disc.—The disc proper is inconspicuous, shallow, and im-

mersed, but is surmounted by a ring of five conspicuous fleshy nectaries about the pistil, which, however, are actually coalesced into a more or less unified ring. The nectaries are partially adnate to the walls of the carpels, at least at the base. The nectaries appear of little taxonomic use.

Fruit.—The fruit consists of a pair of divaricate, leathery, glandular-punctate follicles containing many striate, albuminous, ecomose seeds immersed in an oily arilar pulp. The leathery pericarp eventually becomes coriaceous, and appears at that time to undergo a ventral dehiscence. The embryo is straight.

It appears probable that were fruiting specimens of each species abundant peculiar diagnostic characters would be available based upon the general shape and size, form of glandulosity, etc. At present, however, the fruit of relatively few species is known, and in the following keys, the fruit is entirely omitted.

Systematic Position

Concerning the affinities of the genus *Stemmadenia*, Richard was much better orientated than Bentham. Bentham,[1] in describing the genus, wrote in part: "The size and form of the flowers in the above three species [*S. glabra*, *S. pubescens*, and *S. mollis*] are those of a *Cerbera* or a *Thevetia* from both of which, however, they differ in the calycine glands, and from the latter in the ovary; and in many points also there is a considerable degree of affinity with *Odontadenia*, but that genus again has not the remarkable calyx and glands of *Stemmadenia* . . ." Since superficially all large flowers resemble one another, Bentham was right in associating his new genus with *Cerbera* and *Thevetia*, although he does not mention the significant differences between those genera and *Stemmadenia*. However, in referring to an affinity with *Odontadenia* the fallibility of the obvious is well demonstrated, for *Stemmadenia*, with unappendaged anthers, non-connivent stamens, fleshy follicles. and ecomose seeds, is about as distantly related to *Odontadenia*, with appendaged anthers, connivent stamens, chartaceous follicles, and heavily comose seeds, as two genera in the same family

[1] Benth., *l. c.* 125. 1844.

could be. More recently Miers,[1] evidently deceived by the external similarity of the flowers of *Stemmadenia* to the showy flowers of the *Echitoideae,* pictured the stamens of *S. insignis* with conspicuous basal appendages.

Richard[2] displayed an understanding view of the morphology of Apocynaceous genera when, in describing *Odontostigma,* he remarked "Difiere del genero *Thevetia* sobre todo por su caliz, mas ancho y mas largo y por sus ovarios distintos, conteniendo cada uno gran numero de ovulos y no dos ovulos solamente como en el genero *Thevetia.*" Miers, in following Richard's carpological view of the subject, has justly associated *Stemmadenia* with *Tabernaemontana,* its nearest relative, but has evidently failed to make sufficiently clear the differences which exist between them.

In summing up the results of recent study, it is clear that *Stemmadenia,* by reason of its unappendaged anthers and non-connivent stamens, is a member of the subfamily Plumeroideae of Apocynaceae. Furthermore, by reason of its two carpels forming a divaricate fruit, it belongs to the tribe Plumereae. Finally, the fleshy follicles ally the genus immediately with the genera *Cerbera, Thevetia, Vallesia,* and *Tabernaemontana* in the subtribe *Tabernaemontaninae.*

From the genera *Cerbera, Thevetia,* and *Vallesia, Stemmadenia* differs, as Bentham and Richard have indicated, in the nature of the calycine glands, which are so conspicuously multiplied in *Stemmadenia,* in the calyx, which is conspicuously irregular in the latter genus and regular in *Cerbera* and *Thevetia* and *Vallesia,* and in the fruit, which is monospermous in the latter three genera and polyspermous in *Stemmadenia.* Finally, it is noteworthy that the carpels in *Cerbera* and *Thevetia* develop together, while those of *Stemmadenia* become widely divaricate, in which character it appears related to *Vallesia.*

From the genus *Vallesia, Stemmadenia* also differs in the corolla, which is much larger than in the former genus, and in the inflorescence, which is more reduced. The fleshy pericarp of *Vallesia,* also, is watery and evanescent, differing from the leathery persistent pericarp of *Stemmadenia.*

[1] Miers, *l. c. pl. 10B.* 1878.
[2] Richard, *l. c.* 1853.

The differences between *Tabernaemontana* and *Stemmadenia* have not always been easy to perceive. The most conspicuous difference is in the size of the flowers, which is much greater in the latter genus than in the former. However, technical characters are several and concise. The irregularity of the calyx of *Stemmadenia* again sets it apart from the regular calyx of *Tabernaemontana*. The interior of the corolla-tube in *Tabernaemontana* is naked, and contains appendiculate folds in *Stemmadenia*. The calycine glands of the former are uniseriate, while those of the latter are multiseriate. The nectaries of the former are completely coalesced and adnate to the carpels; the nectaries of the latter are only partially coalesced and are scarcely adnate to the carpels. The filaments of the former are straight, while those of the latter are unguiculate. Also it is believed that the fruit of *Stemmadenia*, which is much larger than that of *Tabernaemontana*, is eventually dehiscent along a ventral suture, while that of the latter genus is always indehiscent. The corolla of *Stemmadenia* is infundibuliform, or, if salverform, the tube is spirally twisted and the calyx is immediately subtended by three bracts, while in *Tabernaemontana* the corolla is always salverform, although the tube is not spirally twisted and bracts are limited to one or two, which subtend the pedicel rather than the calyx itself or are lacking.

Relationships within the Genus

As has already been explained, the genus *Stemmadenia* is readily divisible into two subgenera. The subgenus *Eustemmadenia* comprises plants with infundibuliform corollas, the lobes of which are slightly deflexed dextrorsely. The calyx squamellae are in several series. The sporangia of the anthers are divergent at the base.

The species of the subgenus *Ochrodaphne* possess salverform corollas with lobes which are conspicuously deflexed dextrorsely, and auriculate, giving the flower a striking turbinate appearance. The calyx squamellae are fewer than those of *Eustemmadenia* and are usually in only two or three series. The sporangia of the anthers are nearly parallel to the base.

The pistil of *Ochrodaphne*, also, represents a condition much

nearer coalescence of the carpels than that of *Eustemmadenia*. The carpels of *Eustemmadenia* are prolonged into two distinct stylopodium-like beaks before they finally unite into a common style bearing the stigmatic clavuncle. On the other hand, the

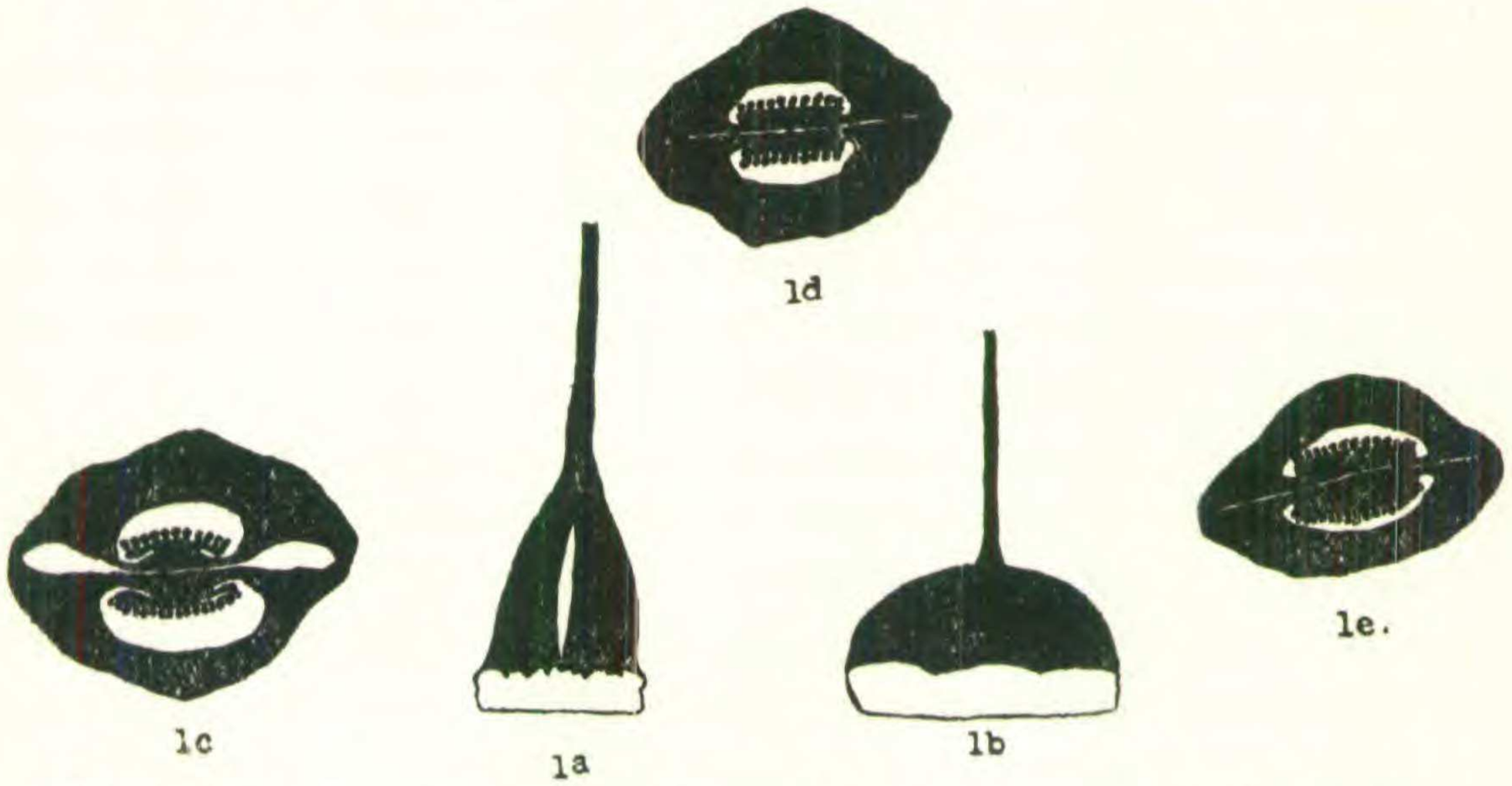


Fig. 1. Carpellary diagrams of *Stemmadenia*. 1a, pistil of *S. tomentosa* var. *Palmeri;* 1b, pistil of *S. grandiflora;* 1c, cross-section of ovary of *S. tomentosa* var. *Palmeri;* 1d, cross-section of ovary of *S. Galeottiana;* 1e, cross-section of ovary of *S. grandiflora*.

style of *Ochrodaphne* arises directly from the summit of the truncate carpels. Diagrams of the pistils of *Eustemmadenia* and *Ochrodaphne* are found in fig. 1, which also diagrams a difference in placentation occurring between the two subgenera.

Eustemmadenia appears to be the more primitive of the subgenera and *Ochrodaphne* the more advanced because of the form of the corollas and pistils of those groups, and also by reason of the reduced calyx-squamellae of the latter. In a future paper reasons for assuming the floral squamellae frequently occurring in the Apocynaceae as staminal vestiges will be fully discussed, and until then the reasons for regarding the reduction of squamellae as a modified rather than a primitive state must remain implied.

For morphological reasons which have already been advanced, *Stemmadenia* is apparently more primitive than its closest neighboring genus, *Tabernaemontana*, and should therefore logically be placed after that genus in a phylogenetic synopsis of the family Apocynaceae. At present, in the system of K. Schu-

mann in Engler and Prantl's 'Naturlichen Pflanzenfamilien,' this order is reversed. This latter order is also found in the 'Genera Phanerogamarum' of Dalla Torre and Harms. The logic of viewing *Stemmadenia* as more primitive rather than more advanced than *Tabernaemontana* is perceived when the genus is split into the two subgenera, *Eustemmadenia* and *Ochrodaphne*, indicating an advance from a simple corolla and numerous squamellae to a more highly modified corolla and reduced squamellae, including an advance in the coalescence of the carpels, tendencies finally developing a climax in the morphology of the genus *Tabernaemontana*.

The species within the group *Ochrodaphne* are homogeneous and not divisible into subgroups, but the species of *Eustemmadenia* are clearly divisible into two sections, illustrating an approach from the infundibuliform corolla characteristic of the subgenus to the salverform corolla of *Ochrodaphne*. Of these, the *obovatae* possess a typically infundibuliform corolla with a nearly conical proper-throat and a dextrorsely twisted tube, while the *Galeottiae* possess a modified form of infundibuliform corolla with a long cylindrical proper-throat, and a tube which is without dextrorse spiral twisting. Apparently the only other morphological difference which accompanies the corollar characters of these sections is the amount of space left between the carpels as an index of the degree to which carpellar fusion has progressed. Figs. 1c and 1d illustrate diagrammatically cross-sections of the pistils of *S. tomentosa* var. *Palmeri* and *S. Galeottiana*, representatives respectively of the sections *obovatae* and *Galeottiae*. It is easily perceived that the carpels of the latter are the more nearly coalesced, which corroborates the judgment of it as the more advanced, phylogenetically. The carpels of the subgenus *Ochrodaphne*, as fig. 1e testifies, are at about the same stage of coalescence as those of the *Galeottiae* section of *Eustemmadenia*.

Geographical Distribution

The genus *Stemmadenia* is confined apparently to the tropical regions of continental America, lying between the Equator and the Tropic of Cancer roughly, although it also occurs slightly more to the north of those arbitrary bounds as far as southern

Chihuahua in Mexico, and doubtless also farther to the south, especially in Ecuador.

The species of the genus are frequenters of sub-Cordilleran underbrush, and range in height from two to twelve meters for mature specimens. The fruit is said by Miers to constitute a favorite food for the larger birds of the region, and seeds are probably distributed by means of those agents.

As fig. 2 indicates, the subgenus *Eustemmadenia* and the subgenus *Ochrodaphne* coincide in their ranges in Central America, but have distinctive ranges, *Eustemmadenia* towards the North, and *Ochrodaphne* towards the South. However, *S. obovata* var. *mollis*, one of the most widespread and common representatives of *Eustemmadenia* sect. *obovatae*, has twice been collected about Guayaquil, Ecuador, and once near Yungas, Bolivia, imparting a most singular appearance to a map of the distribution of the genus. The disrupted nature of the distribution of the subgenus *Eustemmadenia* thus disclosed urges a consideration of it as a relict group; thus as in all probability the more primitive of the subgenera, and the section *obovatae* as the ancestor of the entire group, even as a study of the morphology alone indicated.

Although Richard, in describing *Odontostigma Galeottiana*, stated that the specimens were from the environs of Havana, Cuba, and although one would naturally expect to find representatives of a genus so frequent naturally in Central America in the Antilles, no evidence of the presence of the genus in Cuba or the other Caribbean Islands has been found, either in herbaria or in published floras of the region. It appears probable that Galeotti's specimen from which Richard drew his description was in reality collected in Mexico, rather than in Cuba, as was understood by Richard.

ABBREVIATIONS

In citing specimens, the following abbreviations for herbaria have been employed: G = Gray Herbarium of Harvard University; NY = Herbarium of the New York Botanical Garden; US = United States National Herbarium; ANSP = Academy of Natural Sciences of Philadelphia; F = Herbarium of the Field

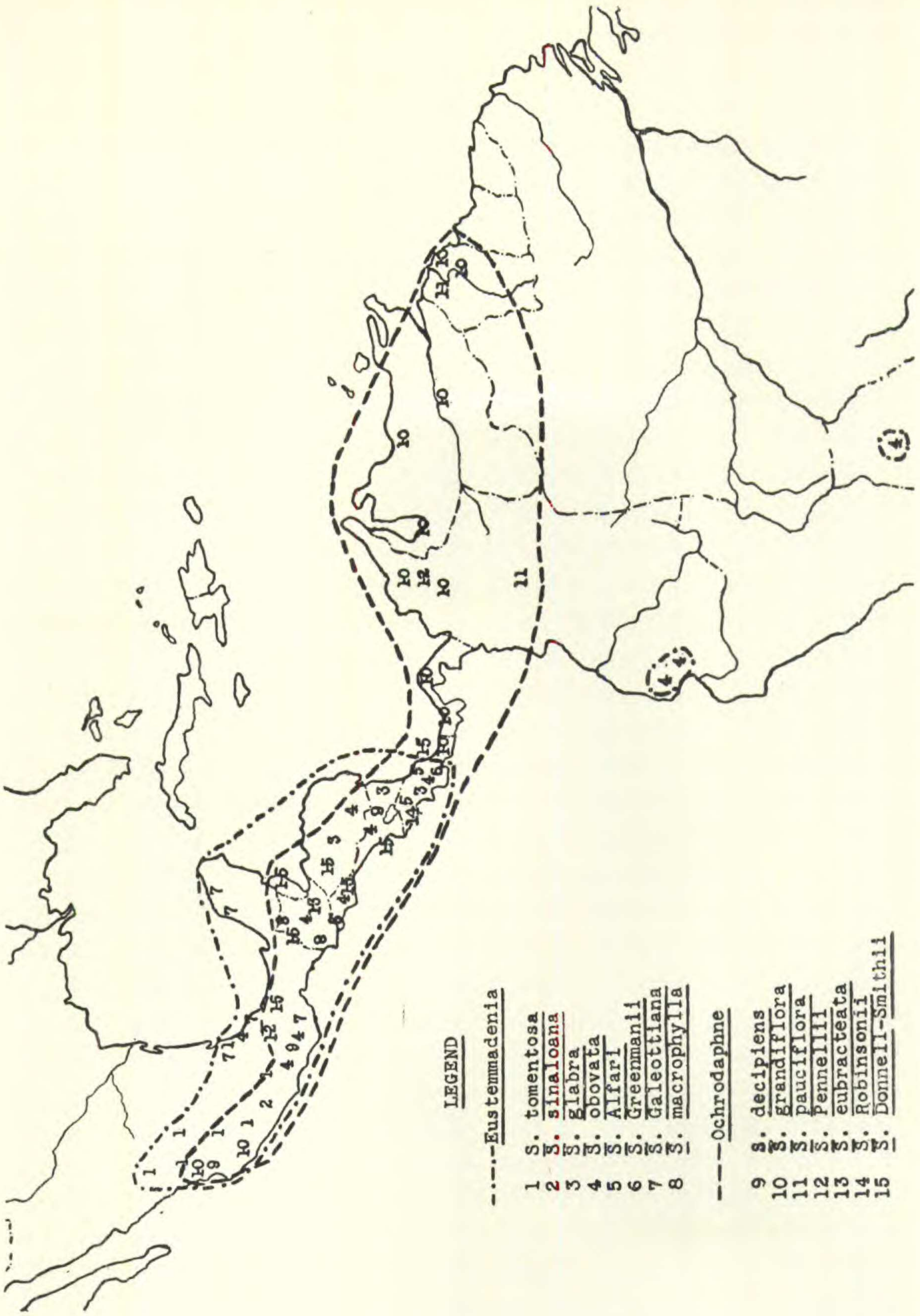


Fig. 2.—Showing distribution of species of *Stemmadenia*

Museum of Natural History; MBG = Herbarium of the Missouri Botanical Garden.

TAXONOMY

Stemmadenia Benth. Bot. Voy. Sulph. 124. *t. 44.* 1844; Lindl. Veg. Kingd. 601. 1847; Walp. Rep. 468. 1847; Pfeif. Nom. Bot. **2**: 1270. 1874; Benth. & Hook. Gen. Pl. **2**: 707. 1876; Miers, Apoc. S. Am. 74. 1878; Hemsl. Biol. Cent.-Am. Bot. **2**: 310. 1881; Durand, Ind. Gen. Phan. n. 4615. 1888; Baill. Hist. Pl. **10**: 196. 1891; K. Sch. in Engl. & Prantl, Nat. Pflanzenfam. **4**: 148. 1895; Standl. Contr. U. S. Nat. Herb. **23**: 1155. 1924.

Odontostigma A. Rich. (non Zoll. & Mor.) Fl. Cub. Fanerog. **2**: 86. 1853.

Stemmaderia B. D. Jackson, Ind. Kew. **2**: 331. 1894. err. typ.

Lactescent shrubs or small trees 2–15 m. tall. Leaves entire, opposite, glabrous or pubescent, petiolate, the sheaths of the petioles meeting in a shallow ring about the stem and sheltering in the crux many small fusiform glands. Inflorescence a terminal reduced raceme of several flowers. Corolla large, infundibuliform or salverform, white or yellow, the limb of 5 equal lobes dextrorsely reflexed and occasionally auriculate, bearing 5 linear interior appendiculate folds opposite and slightly above the attachment of the stamens. Calyx 5-parted, the lobes imbricate, unequal, usually 3 larger interior and 2 smaller exterior, bearing several cycles of small fusiform glands within and near the attachment of the disc. Stamens 5, included, attached to the corolla at the summit of the proper-tube, alternate with the corolla-lobes; filaments very short and thick, unguiculate at the attachment to the anthers; anthers of 2 elongate unappendaged sporangia. Carpels 2, sessile, unilocular, bearing many ovules upon a lateral binate ventral placenta, produced apically into a long filiform style; stigma terminal, borne upon a fleshy truncate clavuncle. Disc proper shallow, immersed, entire; nectaries fleshy, coalesced into a more or less irregular ring about, and slightly adnate to, the carpels. Fruit a pair of divaricate, leathery, glandular-punctate follicles containing many striate, albuminous, ecomose seeds immersed in an oily arilar pulp; embryo straight.

Type species: *S. glabra* Benth. Bot. Voy. Sulph. 124. *t. 44.* 1844.

SYNOPSIS OF THE SUBGENERA AND SECTIONS

KEY TO THE SUBGENERA

Corolla infundibuliform, the lobes dextrorsely reflexed, but only slightly auriculate; bracts immediately subtending the calyx. . . . . .Subgen. I. EUSTEMMADENIA

Corolla salverform, the lobes dextrorsely reflexed and very strongly auriculate; bracts placed about midway upon the pedicels. .Subgen. II. OCHRODAPHNE

SUBGENUS I. EUSTEMMADENIA Woodson

Subgenus I. EUSTEMMADENIA Woodson, n. subgen.

Corolla infundibuliform, the lobes dextrorsely reflexed and very slightly auriculate; calyx-squamellae in several series of different lengths; sporangia of the anthers divergent at the base; rim of the coalesced nectaries irregularly folded and lobed; corollar appendages relatively long, 1.5–2.0 cm. long; bracts immediately subtending the calyx.

Section 1. OBOVATAE Woodson. Proper-throat of the corolla conical, about as long as broad.

KEY TO THE SPECIES

a. Calyx relatively short, 1–5 mm. long.
  b. Calyx-lobes oblong to ovate, acute at the apex, 3–5 mm. long.
    c. Under-surface of leaves persistently and uniformly tomentose. . . . . *1. S. tomentosa*
    cc. Under-surface of leaves slightly barbate in the axils of the midvein, becoming glabrous or glabrate. . . . *1a. S. tomentosa* var. *Palmeri*
  bb. Calyx-lobes subreniform, rounded at the apex, 1–2 mm. long. . . *2. S. sinaloana*
aa. Calyx relatively long, 1.5–3 cm. long.
  b. Proper-tube about as long as the calyx; inflorescence glabrous. . . *3. S. glabra*
  bb. Proper-tube much surpassing the calyx; inflorescence pubescent.
    c. Upper-surface of leaves glabrate. . . . . *4. S. obovata*
    cc. Upper-surface of leaves persistently pubescent. . . *4a. S. obovata* var. *mollis*

1. Stemmadenia tomentosa Greenm. Proc. Am. Acad. 35: 310. 1900; Standl. Contr. U. S. Nat. Herb. 23: 1156. 1924.

Shrubs or small trees, 2–12 m. tall; leaves 8–15 cm. long, 5–7 cm. broad, glabrous or glabrate above, tomentose beneath, petioles 4–8 mm. long; inflorescence 2–5-flowered; corolla yellow, the proper-tube 2–2.5 cm. long, the proper-throat conical,

2–3 cm. long, 1.5–2 cm. broad at the orifice, the limb 2–3 cm. broad; calyx-lobes 4–5 mm. long, the segments oblong to ovate, acute at the apex, somewhat imbricate, both the larger and the smaller yellowish; follicles 4–4.5 cm. long, 3–3.5 cm. broad, acute at the apex.

Distribution: waste-lands, central and southern Mexico.

Specimens examined:

MEXICO:

VERA CRUZ: San Juan, 1889, *Heilprin & Baker* (ANSP).

JALISCO: lava beds near Zapotlan, May 19, 1893, *Pringle 4370* (G TYPE, NY, US, MBG).

SINALOA: Sinaloa, April 2, 1910, *Rose, Standley & Russell 13874* (US).

1a. Var. **Palmeri** (Rose) Woodson, n. comb.

Stemmadenia Palmeri "Kosc." ex Urbina, Pl. Mex. 214. 1897, *nomen*.

Stemmadenia Palmeri Rose ex Greenm. Proc. Am. Acad. **35**: 311. 1900.

"*Stemmadenia Palmeri* Rose & Standl." in Standl. Contr. U. S. Nat. Herb. **23**: 1156. 1924.

Leaves glabrous or glabrate above, beneath barbate in the axils of the midvein, or glabrate; calyx-lobes 3–5 mm. long, greenish.

Distribution: waste-land, and hedgerows, general over central and southern Mexico.

Specimens examined:

MEXICO:

CHIHUAHUA: Tierras Verdes, May, 1891, *Hartmann 534* (G); southwestern Chihuahua, Aug.–Nov. 1885, *E. Palmer M* (G, US); Batopillas, April, 1892, *Hartmann 1032* (G).

SINALOA: Ymala, Aug. 16–25, 1891, *E. Palmer 1470* (US TYPE); Mazotlan, April 5, 1910, *Rose, Standley & Russell 14064* (US); vicinity of Rosario, April 14, 1910, *Rose, Standley & Russell 14544* (US); San Ignacio, June 19, 1918, *Montes & Salazar 405* (US); Guadaloupe, April 18, 1910, *Rose, Standley & Russell 14675* (US); La Cruz, 1921, *Ortega 4175* (US); between Rosario and Concepcion, July 27, 1897, *Rose 3260* (US); San

Ignacio, March 12, 1918, *Montes & Salazar 268* (US); Rosario, July 8, 1897, *Rose 1573* (US); Colomas, July 16, 1897, *Rose 1688* (US).

JALISCO: Baranca, near Guadalajara, June, 1886, *E. Palmer 132* (G, US); Chiquilistlan, May 15, 1892, *Jones 335* (MBG, US); Tequila, July 5–6, 1899, *Rose & Hough 4777* (US); Baranca, near Guadalajara, May 28, 1891, *Pringle 5151* (G); vicinity of Colima, April 5, 1897, *Seler 3436* (G); Baranca of Guadalajara, alt. 4000 ft., June 10, 1898, *Pringle 6872* (G, NY, F, ANSP, US, MBG); Guadalajara, June 25, 1892, *Pringle 5363* (G); San Sebastien, Jan. 15, 1927, *Mexia 1490* (US); Bolanos Aug. 10–19, 1897, *Rose 2888* (US).

DURANGO: Chocala, March 7, 1899, *Goldman 358* (US).

MORELOS: Cuernavaca, May 11, 1898, *Pringle 6847* (US).

NAYARIT: Ojos de Agua, near Ixtlan, Sept. 23, 1926, *Mexia 733* (US).

Popular names of this variety are "Berrarco," "Berraco ó Tapaco," and the gum of the fruit is said to be used like chicle (*Montes & Salazar 405*, US).

The embarrassment of monographers who find themselves forced to regard as "typical" an anomalous form of a species because of priority in publication over a more common variety is illustrated in a peculiar fashion by *Stemmadenia tomentosa* Greenm. and its var. *Palmeri*. As early as 1891 the herbarium name "*Stemmadenia Palmeri* Rose" was distributed with specimens of the glabrescent or barbate variety of the former species. The name did not appear in publication, however, until 1893, when Urbina, in compiling his 'Catalogue of Mexican Plants,' happened upon specimens of the genus bearing the inscription of *S. Palmeri* Rose in a rather poor script, and erroneously published the name for the first time as a *nomen nudum*. Urbina mistook the name of Dr. Rose for an abbreviation, and gave the author as "Kosc." It is indeed fortunate that a description was not included under that authorship.

In 1900 Dr. Greenman published *Stemmadenia tomentosa*, and in so doing spoke of the characteristics of *S. Palmeri* Rose, which he evidently assumed to be a correctly published name. It was not until 1924 that *Stemmadenia Palmeri* was published

by Rose in Standley's 'Trees and Shrubs of Mexico.' The legal place of publication of the species must evidently be regarded as ex Greenman, Proc. Am. Acad. 35: 311. 1900.

2. Stemmadenia sinaloana Woodson, n. sp.[1] Pl. 48, fig. 1.

Shrubs or small trees; leaves 8–12 cm. long, 5–6 cm. broad, glabrous, or very slightly puberulent upon the lower surface, petiolate, the petioles 7–10 mm. long; inflorescence 1–4-flowered; corolla yellow, the proper-tube 1.5–2 cm. long, the proper-throat conical, about 1.5 cm. long, about 1.5 cm. broad at the orifice, the limb 1.5–2 cm. long; calyx about one-sixteenth the length of the proper tube, the segments ovate-reniform, 1.2 mm. long, about 4 mm. broad, obtuse at the apex, or completely rounded, scarcely imbricated, unequal, greenish; follicles unknown.

Distribution: known only from the type locality in Sinaloa.

Specimens examined:

MEXICO:

SINALOA: Rosario, Jan. 1895, *Lamb 467* (G TYPE).

S. sinaloana is especially noteworthy in the genus *Stemmadenia* by reason of its peculiarly reduced calyx. In that respect it is closest related to *S. tomentosa* Greenm., from which it differs in having a calyx less than one-half as large (1–2 mm. long), and in having the calyx-lobes subreniform and rounded at the apex instead of oblong and ovate with acute or acuminate apex as in the latter species.

3. Stemmadenia glabra Benth. Bot. Voy. Sulph. 124. *t. 44.* 1844; Hemsl. Biol. Cent.-Am. Bot. **2**: 310. 1881; Miers, Apoc. S. Am. 74. 1878; K. Sch. in Engl. & Prantl, Nat. Pflanzenfam. 4^2: 149. 1895; Standl. Contr. U. S. Nat. Herb. **23**: 1156. 1925; Standl. & Calderón, Lista Prélim. Pl. Sal. 174. 1925. Pl. 47, fig. 1.

Shrubs or small trees, 2–10 m. tall; leaves 14–20 cm. long, 7–8 cm. broad, glabrous, petiolate, petioles 5–10 mm. long;

[1] **Stemmadenia sinaloana** sp. nov., arborea glabra vel subpuberulenta; foliis oblongo-lanceolatis 8–12 cm. longis 5–6 cm. latis; petiolis 7–10 mm. longis; corollae tubo conico-infundibuliformo 3–3.4 cm. longo, lobis ca. 1.5 cm. longis; calycis lobis parvis ovato-reniformibus inaequalibus ca. 2 mm. longis ca. 4 mm. latis obtusis, viridibus.—Sinaloa, Rosario, Jan. 1895, *F. H. Lamb 467* (Gray Herb., TYPE).

inflorescence 1–4-flowered; corolla deep yellow, the proper-tube 2–2.5 cm. long, the proper-throat conical, about 2 cm. long, 2–2.5 cm. broad at the orifice, the limb 2.5–3 cm. long; calyx about equalling the length of the proper tube, the segments 1.5–2.5 cm. long, .8–1.0 cm. broad, strongly imbricate in two unequal series, the larger yellow, the smaller greenish yellow; follicles about 5 cm. long, 3–3.5 cm. broad.

Distribution: tropical forests and thickets, Central America. Reported also from Mexico.

Specimens examined:

COSTA RICA: between San Pedro de Montes de Oca and Curridabat, Dept. San José, Feb. 2, 1924, *Standley 32793* (US); Cartago, Feb. 1924, *Standley 35459* (US).

HONDURAS: Amapala, Isla de Tigre, Feb. 14, 1922, *Standley 20713* (US).

EL SALVADOR: vicinity of La Unión, Dept. La Unión, alt. 150 m., Feb. 13–21, 1922, *Standley 20686* (G, NY, US); Laguna de Magugüe, Dept. La Unión, alt. 60 m., Feb. 18, 1922, *Standley 20943* (G, NY, US); La Unión, Sept. 21, 1860, *Sutton-Hayes* (G).

NICARAGUA: southwestern slopes of Santiago Volcano, near Masaya, alt. 300–480 m., July 5, 1923, *Maxon 7647* (G, US); Ometepe Island, Jan. 1893, *C. L. Smith* (G); Managua, shores of Lake Managua, June 24, 1923, *Maxon, Harvey & Valentine 7270* (US); Managua, vicinity, June 30, 1923, *Maxon, Harvey & Valentine 7539* (US); Laguna de Masaya, July 6, 1923, *Maxon 7727* (US).

Dr. Sutton Hayes remarks (*Sutton-Hayes*, G) that the popular name of this species in El Salvador is "Cajon del Mico." According to Standley (*Standley 32793*, US), the popular name in Costa Rica is "huevos de Caballo," or "Girijarro," and the sap is used for corns and tooth-ache.

4. Stemmadenia obovata (Hook. & Arn.) K. Sch. in Engl. & Prantl, Nat. Pflanzenfam. **4²**: 149. 1895.

Bignonia (*?*) *obovata* Hook. & Arn. Bot. Beech. Voy. 439. 1841.

Stemmadenia pubescens Benth. Bot. Voy. Sulph. 125. 1844;

Miers, Apoc. S. Am. 74. 1878; Hemsl. Biol. Cent.-Am. Bot. **2**: 310. 1881.

Shrubs or small trees, 2–15 m. tall; leaves 10–20 cm. long, 7–10 cm. broad, pubescent, or glabrate above, petiolate, petioles 5–8 mm. long; inflorescence 1–6-flowered; corolla deep yellow, the proper-tube 1.5–2.5 cm. long, the proper-throat 1.5–3 cm. long, 2–2.5 cm. broad at the orifice, the limb 1.5–2.5 cm. long; calyx much surpassed by the length of the proper-tube, the segments 1.5–2 cm. long, .8–1.0 cm. broad, strongly imbricated in two unequal series, both series yellowish; follicles 4–4.5 cm. long, 3–3.5 cm. broad, acute at the apex.

Distribution: tropical forests and thickets, southern Mexico and Central America.

Specimens examined:

Mexico:

Guerrero: El Correjo, alt. 900 m., May 18, 1899, *Langlassé 1029* (G).

Costa Rica: Salinas, July, 1890, *Pittier 1177* (US).

Nicaragua: Managua, vicinity, June 30, 1923, *Maxon, Harvey & Valentine 7542* (US); La Paz, Dept. Leon, Jan. 31, 1903, *Baker 2270* (G, US); Managua, June 30, 1926, *Chaves 215* (US).

El Salvador: near La Cebadilla, 1922, *Calderón 1230* (G); Laguna de Olomega, Dept. San Miguel, alt. 75 m., Feb. 20, 1922, *Standley 21034* (G).

4a. Var. mollis (Benth.) Woodson, n. comb.

Stemmadenia mollis Benth. Bot. Voy. Sulph. 125. 1844; Hemsl. Biol. Cent.-Am. Bot. **2**: 310. 1881; Miers, Apoc. S. Am. 75. 1878; K. Sch. in Engl. & Prantl, Nat. Pflanzenfam. **4²**: 149. 1895; Urbina, Pl. Mex. 214. 1897; Donn.-Sm. Enum. Pl. Guat. **4**: 105. 1895; Areschoug, Pl. ca. Guayaquil Coll. 127. 1910; Standl. Contr. U. S. Nat. Herb. **23**: 1156. 1924; Standl. & Calderón, Lista Prélim. Pl. Sal. 174. 1925.

Stemmadenia calycina Brandg. Univ. Cal. Publ. Bot. **10**: 188. 1922.

Upper surface of leaves persistently tomentose.

Distribution: tropical forests and hedgerows, southern Mexico, northern Central America, and northwest-central South America.

Specimens examined:

MEXICO:

VERA CRUZ: Baños del Carrizal, Aug. 1912, *Purpus 6230* (G, NY, US, MBG); San Francisco, May, 1894, *C. L. Smith 1339–1374* (G); Remulatero, April, 1922, *Purpus 8771* (G, NY, US, MBG).

GUERRERO: Iguala, Aug. 1905, *Rose, Painter & Rose 9274* (MBG, NY, US); El Correjo, May 18, 1899, *Langlassé 1029* (US).

OAXACA: Camino de Tonomeca, May 7, 1917, *Conzatti & Reko 3258* (US, MBG).

CHIAPAS: Petapa, May 29, 1904, *Goldman 1027* (US).

COSTA RICA: Salinas, July, 1890, *Pittier 2908* (US); Nicoya, April, 1900, *Tonduz 13900* (G, NY, US); Liberia, Dept. Guanacaste, April, 1893, *Shannon 5042* (US); Las Huacas, Nicoya Peninsula, May 24, 1903, *Cook & Doyle 723* (US).

EL SALVADOR: Sonsonate, Dept. Sonsonate, alt. 220–300 m., March 18–27, 1922, *Standley 22372* (G, NY, US); Laguna de Olomega, Dept. San Miguel, Feb. 20, 1922, *Standley 21034* (US); La Cebadilla, Dept. San Salvador, 1922, *Calderon 1230* (US); between San Martin and Laguna de Ilopanga, Dept. San Salvador, April 1, 1922, *Standley 22539* (US).

NICARAGUA: Momotombo, May 27, 1895, *C. L. Smith 126* (G, NY); Los Braziles, Jan. 28, 1928, *Mell 28* (NY); south of Managua, March 3, 1922, *Greenman & Greenman 5713* (MBG).

GUATEMALA: Fiscal, alt. 3700 ft., May 31, 1909, *Deam 6070* (G, US); Agua Caliente, March 28, 1922, *Greenman & Greenman 5920* (MBG); Barranquillo, Dept. El Progreso, May 21, 1920, *Popenoe 977* (US); between Chiquín and Crapeche Grande, Dept. Guatemala, March 19, 1905, *Pittier 133* (US); El Rancho, Dept. Jalapa, April 4, 1905, *Maxon & Hay 3766* (US); Dept. Jalapa, March 10, 1905, *Kellerman 4511* (US).

ECUADOR: Guayaquil, Feb. 1885, *Rusby 931* (NY); hillsides near Guayaquil, Sept.–Oct. 1925, *Mille 59* (NY); Durán, Nov. 5–8, 1918, *Rose & Rose 23612* (NY).

BOLIVIA: near Yungas, alt. 4000 ft., 1885, *Rusby 1163* (NY).

Section 2. GALEOTTIAE Woodson. Proper-throat of the corolla cylindrical, much longer than broad.

KEY TO THE SPECIES

a. Proper-tube about equalling the length of the proper-throat; corolla-tube, *sensu-latiore*, 3–3.5 cm. long.
  b. Calyx-lobes 1.5–2 mm. long; corolla-limb 5–8 mm. broad.....*5. S. Alfari*
  bb. Calyx-lobes 5–7 mm. long; corolla-limb 10–15 mm. broad..*6. S. Greenmanii*
aa. Proper-tube much surpassed by the length of the proper-throat; corolla-tube, *sensu-latiore*, 4.5–6 cm. long.
  b. Calyx 1–1.5 cm. long, the lobes distinctly imbricated.....*7. S. Galeottiana*
  bb. Calyx 4–5 mm. long, the lobes scarcely imbricated.....*8. S. macrophylla*

5. Stemmadenia Alfari (Donn.-Sm.) Woodson, n. comb.

Tabernaemontana Alfari Donn.-Sm. Bot. Gaz **24:** 396. 1897.

Small tree 3–4 m. tall; leaves 7–11 cm. long, 3.5–5 cm. broad, glabrous, acuminate, subspathulate, petiolate, petioles 1–1.5 cm. long; inflorescence 1–3-flowered; corolla infundibuliform or occasionally subinfundibuliform, yellow or yellowish white, the tube, *sensu-latiore*, 3–3.5 cm. long, the limb 1–1.5 cm. broad; calyx-lobes 1.5–2 mm. long, 1.5–2 mm. broad, scarcely imbricated in two series, both the inner and the outer yellowish; follicles unknown.

Distribution: hedgerows and waste-lands, Costa Rica.

Specimens examined:

COSTA RICA: San Pedro, near San Ramón, hedgerows, alt. 1300 m., April 13, 1913. *Tonduz 17653* (F); Limoncito and Vuelta, alt. 1100 m., March, 1897, *Pittier 11094* (US TYPE).

6. Stemmadenia Greenmanii Woodson, n. sp.[1] Pl. 48, fig. 2.

Shrubs or small trees 1–6 m. tall; leaves 8–12 cm. long, 4–5 cm. broad, glabrous, petiolate, petioles 5–8 mm. long; inflorescence 2–5-flowered; corolla yellowish white, the proper-tube about 1.5 cm. long, the proper-throat cylindrical, about 2.0 cm. long, about .8 cm. broad at the orifice, the limb 1–1.5 cm. broad; calyx about one-third the length of the proper-tube, the segments .5–.7 cm. long, .3–.4 cm. broad, strongly imbricated in two unequal series, both series yellowish; immature specimens oblong-lanceolate, acute at the apex.

[1] **Stemmadenia Greenmanii** sp. nov., arborea glabra; foliis oblongo-lanceolatis 8–12 cm. longis 4–5 cm. latis; petiolis 5–8 mm. longis; corollae tubo cylindrico-infundibuliformo 3–5 cm. longo, lobis 1–1.5 cm. longis; lobis calycis ovatis inaequalibus ca. .5 cm. longis 3–4 mm. latis flavis; folliculis oblongo-lanceolatis acutibusque.—Costa Rica, San Ramon, June 4, 1901, *Brenes 14275* (Gray Herb., TYPE).

Distribution: tropical forests and thickets, Costa Rica.

Specimens examined:

COSTA RICA: San Ramón, alt. 1100 m., May 29, 1901, *Brenes 14275* (G TYPE); San Ramón, June 4, 1901, *Brenes 14278* (G).

This species is evidently very local, but is very distinct. The nearest related species is undoubtedly *S. Alfari*, from which, however, it differs radically in the size of the calyx and all the floral parts. The species is dedicated to Dr. J. M. Greenman, by all odds the most discriminating of recent students of the group.

7. Stemmadenia Galeottiana (A. Rich.) Miers, Apoc. S. Am. 76. 1878. Pl. 47, figs. 2–3.

Odontostigma Galeottiana A. Rich. in Sagra, Hist. Cub. **11**: 868. *t. 60* (Fl. Cub. Fanerog. **2**: 86). 1853; Walp. Ann. **5**: 477. 1858.

Echites bignoniaeflora Schl. Linnaea **26**: 372. 1853.

Stemmadenia bignoniaeflora (Schl.) Miers, Apoc. S. Am. 76. 1878; Donn.-Sm. Enum. Pl. Guat. **5**: 51. 1899; Standl. Contr. U. S. Nat. Herb. **23**: 1156. 1924.

Stemmadenia insignis Miers, Apoc. S. Am. 76. *t. 10B*. 1878; Hemsl. Biol. Cent.-Am. Bot. **2**: 310. 1881; Standl. Contr. U. S. Nat. Herb. **23**: 1156. 1924.

Tabernaemontana laurifolia Schott (non L., nec Ker, neque Blanco) ex Miers Apoc. S. Am. 76. 1878 *nomen*.

Stemmadenia bella Miers, Apoc. S. Am. 77. 1878; Donn.-Sm. Enum. Pl. Guat. **5**: 51. 1899; Standl. Contr. U. S. Nat. Herb. **23**: 1156. 1924.

Stemmaderia Galeottianum B. D. Jackson, Ind. Kew. **2**: 331. 1844, err. typ.

Shrubs, 1–3 m. tall; leaves 9–12 cm. long, 4–5 cm. broad, glabrous or slightly puberulent upon the lower surface, petiolate, petioles 8–11 mm. long; inflorescence 1–4-flowered; corolla yellow, the proper-throat 4–5 cm. long, 1.0–1.3 cm. broad at the orifice, the proper-tube 8–10 mm. long, the limb 2.5–3 cm. long; calyx segments 10–14 mm. long, 4–7 mm. broad, strongly imbricated in two unequal series; follicles 2–2.5 cm. long, 1.5–1.7 cm. broad.

Distribution: tropical forests of southern Mexico and Costa Rica.

Specimens examined:

MEXICO:

VERA CRUZ: Teocelo, May 8, 1901, *Goldman 575* (US); Zacuapan, March, 1917, *Purpus 7740* (G, NY, US, MBG); Orizaba, March 23, 1867, *Bilimek 269* (G); Orizaba, date lacking, *Botteri 988* (G); Textolo, alt. 3500 ft., April 26, 1899, *Pringle 8103* (G, NY, ANSP, US, F, MBG); Orizaba, April, 1866, *Bourgeau 2440* (G, US).

OAXACA: exact locality lacking, 1841, *Galeotti 1605* (NY cotype?); Sontecomopan, *Galeotti 1599* (US).

YUCATAN: Merida, April 14, 1887, *Millspaugh 27* (F); Izamal, cultivated for its flowers, date lacking, *Gaumer 23204* (F); Merida, Quinta del Obispo, March 18, 1865, *Schott 430* (US, F).

Since *Odontostigma Galeottiana* A. Rich. and *Echites bignoniaeflora* Schl. were both published in 1853 at unknown months, according to the fly-leaves of the journals in which they appeared, it was perplexing whether to conserve *Stemmadenia Galeottiana* or *S. bignoniaeflora*. However, on the fly-leaf of Asa Gray's copy of 'Linnaea' **26**, in which *E. bignoniaeflora* was published, appears the note in Dr. Gray's handwriting that the publication did not actually leave the press until August, 1854. In the absence of contradiction, then, it is assumed that Richard's species appeared in 1853, and is therefore considered to have priority.

8. Stemmadenia macrophylla Greenm. Proc. Am. Acad. **35**: 310. 1900; Donn.-Sm. Enum. Pl. Guat. **6**: 83. 1903.

Shrubs or small trees; leaves 15–20 cm. long, 5–7 cm. broad, glabrous, petiolate, petioles 1.5–2 cm. long; inflorescence 1–4-flowered; corolla yellow, the proper-throat cylindrical, 2.5–3 cm. long, .8–1.2 cm. broad, the proper-tube 1.5–2 cm. long, the limb 2.5–3 cm. broad; calyx about one-half the length of the proper-tube, the segments 4–6 mm. long, 3–4 mm. broad, scarcely imbricated in two unequal series, both series yellowish; follicles unknown.

Distribution: tropical thickets of Guatemala.

Specimens examined:

GUATEMALA: Pansamalá, Dept. Alta Verapaz, alt. 3800 ft., Jan. 1886, *Tuerckheim 981* (G TYPE, NY, US, MBG); Coban, Dept. Alta Verapaz, April, 1889, *Donnell-Smith 1800* (US); San Carlos Miramar, March 19, 1921, 750 m., *Tonduz & Rojas 147* (MBG).

SUBGENUS II. OCHRODAPHNE Woodson

Subgenus I. OCHRODAPHNE Woodson, n. subgen.

Corolla salverform, the lobes dextrorsely reflexed and strongly auriculate; calyx-squamellae in two or three series of nearly uniform length; sporangia of the anthers nearly parallel to the base; rim of the coalesced nectaries nearly smooth; corollar appendages relatively short, 5–7 mm. long; bracts placed midway upon the pedicels. Name coined from ὠχρὸς, yellow, and δάφνη, laurel, from the popular name of *Stemmadenia grandiflora* (Jacq.) Miers, "Yellow Laurel."

KEY TO THE SPECIES

a. Calyx less than one-half the length of the corolla-tube.
  b. Bracts scarious; leaves ovate to ovate-oblong.
    c. Inner series of calyx-lobes only slightly longer than the outer; leaves glabrous throughout, glaucous beneath.
      d. Inflorescence several- or many-flowered; corolla-limb as broad as the length of the tube.
        e. Calyx-lobes 4–6 mm. long, yellowish, appressed; leaves ovate.....*9. decipiens*
        ee. Calyx-lobes 10–15 mm. long, green, spreading; leaves ovate-oblong.....*10. S. grandiflora*
      dd. Inflorescence 1-flowered by abortion; corolla-limb about one-half as broad as the length of the tube..*11. S. pauciflora*
    cc. Inner series of calyx-lobes about twice as long as the outer; leaves finely rufose-puberulent beneath.....*12. S. Pennellii*
  bb. Bracts foliaceous; leaves lanceolate.....*13. S. eubracteata*
aa. Calyx equalling or nearly equalling the length of the corolla-tube.
  b. Calyx-lobes linear-lanceolate; leaves oblong-lanceolate, glabrous throughout.....*14. S. Robinsonii*
  bb. Calyx-lobes ovate; leaves spatulate, glabrous above, the undersurface conspicuously barbate in the axils of the midvein.
.....*15. S. Donnell-Smithii*

9. Stemmadenia decipiens Woodson, n. sp.[1]

[1] Stemmadenia decipiens sp. nov., arborea glabra; foliis ovatis 7–10 cm. longis 4–7 cm. latis, petiolis 5–7 mm. longis; corollae tubo salverformo 2–3 cm. longo, lobis 1–2 cm. longis; lobis calycis ovatis inaequalibus 4–6 mm. longis 2–3 mm. latis flavis; folliculis ovato-oblongis acutibusque.—Mexico, between Rosario and Colomas, Sinaloa, July 12, 1897, *J. N. Rose 1614* (US. TYPE).

Shrubs or small trees, 2–10 m. high; leaves 7–10 cm. long, 4–7 cm. broad, glabrous, petiolate, petioles 5–7 mm. long; inflorescence 3–9-flowered; corolla yellow or yellowish white, the tube 2–3 cm. long, 4–5 mm. broad at the orifice, the limb 1–2 cm. broad; calyx about one-fifth the length of the tube, the segments 4–6 mm. long, 2–3 mm. broad, slightly imbricated in two unequal series, both series yellowish, appressed; immature follicles ovate, attenuate at the apex, mature follicles unknown.

Distribution: southern Mexico and adjacent Central America.

Specimens examined:

MEXICO:

SINALOA: between Rosario and Colomas, July 12, 1897, *Rose 1614* (US, No. 300461 TYPE, 300462); near Rosario, July 24, 1897, *Rose* (US).

OAXACA: Pochutla, April 19, 1917, *Conzatti, Reko & Makrinius 3172* (MBG).

NICARAGUA: Managua, 1925, *René 78* (MBG).

This species has been called *decipiens* because it possesses the smallest calyx of the subgenus *Ochrodaphne*, thus recalling the small calyx-lobes of *S. Palmeri* in the subgenus *Eustemmadenia*, for which it has been mistaken.

10. Stemmadenia grandiflora (Jacq.) Miers, Apoc. S. Am. 75. 1878. Pl. 47, fig. 4.

Tabernaemontana grandiflora Jacq. Enum. Pl. Carib. 14. 1762; L. Mant. 53. 1767; Willd. Sp. Pl. **1**[2]: 1245. 1798; Lam. Dict. **7**: 528. 1806; Roem. & Schult. Syst. **4**: 428. 1819; A. DC. in DC. Prodr. **8**: 368. 1844; G. Don, Gen. Syst. **4**: 88. 1887; Sesse & Mocino, Fl. Mex. 431. 1894; Ramirez, Pl. Mex. 155. 1902; Pulle, Enum. Vasc. Pl. Sur. 381. 1906; Standl. Contr. U. S. Nat. Herb. **27**: 308. 1928.

Shrubs or small trees; leaves 6–8 cm. long, 3–5 cm. broad, glabrous, petiolate, petioles 5–7 mm. long; inflorescence 2-9-flowered; corolla yellowish white, the tube 3–3.5 cm. long, 4–5 mm. broad at the orifice, the limb 1.5–2 cm. broad; calyx about one-third the length of the tube, the segments 8–12 mm. broad, 10–15 mm. long, closely imbricated in two unequal series, both

series green, spreading; follicles 3–3.5 cm. long, 2–3 cm. broad, acute at the apex.

Distribution: tropical forests, southern Mexico, Central America, and northeastern South America.

Specimens examined:

MEXICO:

SINALOA: Colomas, July 16, 1897, *Rose 1711* (US); near Colomas, July 14–17, *Rose* (US).

NAYARIT: vicinity of Acaponeta, Tepic, April 12, 1910, *Rose, Standley & Russell 14484* (US).

COSTA RICA: exact locality and date lacking, *Tonduz 17653* (US).

PANAMA: Chagres, Jan.–March, 1850, *Fendler 234* (G, MBG); exact locality and date lacking, *Duchassaing* (G); Puerto Remedios, Chiriqui, March 31, 1911, *Pittier 3388* (NY, US); Fato, Dept. Colon, along the beach, July 8–10, 1911, *Pittier 3940* (US); David, Chiriqui, Feb. 25, 1911, *Pittier 2824* (US); Cana, April 17, June 8, 1908, *Williams 803* (US); Cerro Gordo, near Culebra, June 29, 1911, *Pittier 3739* (US); Paso del Olá, Prov. Coclé, Dec. 7–9, 1911, *Pittier 5011* (US); Mount Hope Cemetery, Canal Zone, Dec. 28, 1923, *Standley 28840* (US); Punta Paitilla, Nov. 3, 1921, *Heriberto 209* (US); Puerto Obaldia, forests, Oct. 11, 1911, *Pittier 4406* (US); Sabana de Juan Corso, Prov. Panama, near Chepo, Sept. 1911, *Pittier 4748* (US); Panama City, old Experiment Station, June 13, 1923, *Maxon, Harvey & Valentine 7084* (US); Bella Vista, near Panama City, June 12, 1923, *Maxon & Valentine 6948* (US); Juan Diaz, Prov. Panama, near Tapia River, June 1–3, 1923, *Maxon & Harvey 6751 & 6646* (US); Corozal, Canal Zone, Aug. 1924, *Stevens 90* (US); Chivi-Chivi Trail, 2 mi. above Red Tank, Canal Zone, May 28, 1923, *Maxon & Harvey 6599* (US); Barro Colorado Is., Canal Zone, Aug. 18, 1927, *Kenoyer 500* (US); Changuinola Valley, 1927, *Cooper & Slater 63a* (US); Taboga Is., Feb. 26, 1923, *Macbride 2798 & 2799* (US); Barro Colorado Is., Canal Zone, Nov. 18–24, 1925, *Standley 40994* (US).

VENEZUELA: Tovar Colony, Aug. 16, 1855, *Fendler 1027* (G, NY); San Martin, on the Rio de Palomar, Oct. 15, 1922, *Pittier 10516* (G); between La Guaira and Rio Grande, June 12, 1917,

Curran & Haman 971 (G, US); San José & Rio Chico, June 16, 1913, *Pittier 6355* (NY); Cierucunté, April 10, 1922, *Pittier 10288* (NY); La Guavia, July 4, 1900, *Robinson & Lyon* (US); Puerto La Cruz, April, 1914, *Jahn 336* (US); Rio Chico, Miranda, June 20, 1923, *Jahn 1280* (US); between San José and Las Trincheras, Fed. Dist. (Caracas), Oct. 4, 1921, *Pittier 11* (US); Curucuti, March 19, 1918, *Pittier 7774* (US); Perijá, Zulia, 1917, *Tejera 14* (US).

COLOMBIA: Turbaco, Nov. 1920, *Heriberto 461* (US); Cartagena, 1919, *Heriberto 249* (US); between Ciénaga de Santa Marta and the foothills, June 22–30, 1906, *Pittier 1594* (US, NY); San Martin de Loba and vicinity, Bolivar, April–May, 1916, *Curran 12* (US); Santa Marta, 1898–1901, *H. H. Smith 1639* (MBG, NY, ANSP, US).

DUTCH GUIANA: Paramaribo, on way to Kwatta, *Samuels* (US); Paramaribo, forests on the way to the farm of Kwatta, April 27, 1916, *Samuels 384* (G); Paramaribo, forest behind Gongrypstreet, April 12, 1916, *Samuels 385* (G); Paramaribo, May 10, 1905, *Mayo* (ANSP); "Surinam," *Weigelt* (ANSP).

This common species is known popularly in Panama as "Huevo de Gato," "Lechosa," and "Venenillo"; in Venezuela as "Hueves de Burro"; and in Mexico as "Lechoso." Called "yellow laurel" by G. Don.

11. Stemmadenia pauciflora Woodson, n. sp.[1] Pl. 49, fig. 1.

Shrubs or small trees; leaves 8–12 cm. long, 2.5–5 cm. broad, glabrous, petiolate, petioles 2–3 mm. long; inflorescence 1-flowered by abortion; corolla yellow or yellowish white, salverform, the tube 3–4 cm. long, 3–4 mm. broad at the orifice, the limb 1–1.5 cm. broad; calyx about one-fourth the length of the tube, the segments 7–9 mm. long, 6–9 mm. broad, strongly imbricated in two unequal series, both series green; follicles unknown.

Distribution: north-central Colombia and Guiana.

[1] **Stemmadenia pauciflora** sp. nov., arborea glabra; foliis oblongo-lanceolatis 8–12 cm. longis 2.5–5 cm. latis, petiolis 2–3 mm. longis; cymis unifloris abortivis; corollae tubo salverformo 3–4 cm. longo, lobis 1–1.5 cm. longis; lobis calycis ovatis inaequalibus 7–9 mm. longis 6–9 mm. latis viridis; folliculis ignotis.—Colombia, between Espinal and Cuamo, Tolima, open loam along stream, alt. 350–400 m., July 21, 1917, *Pennell & Rusby 186* (NY TYPE).

Specimens examined:

COLOMBIA: open loam along stream, between Espinal and Cuamo, alt. 350–400 m., Tolima, July 21, 1917, *Pennell & Rusby 186* (NY TYPE).

DUTCH GUIANA: "in sylvis pr. urbem Paramaribo," March–April, 1844, *Kappler 1565* (MBG).

Stemmadenia pauciflora, so-called because of the singularly reduced inflorescence, is equally distinct because of the short corolla-limb. At present the two specimens referable to the species constitute a rather scattering range, but doubtless with increased collecting activity additional localities will become known. The young inflorescence is normally composed of several buds, all of which abort very early except the one destined to produce the fully-developed flower. This character of the inflorescence is demonstrated nicely by the two above-cited specimens. Upon *Kappler 1565* three inflorescences appear, one with one aborting and one developing bud, and two with full-blown flowers and one aborted bud each. *Pennell & Rusby 186* likewise demonstrate this remarkable propensity. On that sheet (NY) three inflorescences appear, one with one aborting and one developing bud, another with two aborted and one developing bud, and another with a full-blown flower and one aborted bud.

12. Stemmadenia Pennellii Woodson, n. sp.[1]

Shrubby vines (?) or shrubs; leaves 7–9 cm. long, 3–4 cm. broad, glabrous or glabrate above, beneath softly rufous-puberulent, petiolate, petioles 1–3 mm. long; inflorescence 2–4-flowered; corolla salverform, yellow, the tube 3–3.5 cm. long, the limb 2.5–3 cm. broad; calyx-lobes in two very unequal series, the inner about 2 cm. long, the outer 1.2–1.5 cm. long, 7–10 mm. broad, strongly imbricated; follicles unknown.

[1] Stemmadenia Pennellii sp. nov., arborea vel vinea frutescens (?), foliis oblongo-lanceolatis 7–9 cm. longis 3–4 cm. latis supra glabris vel glabratis subtus rufo-puberulentis; petiolis 1–3 mm. longis; corollae tubo salverformo 3–3.5 cm. longo, lobis ca. 2.5 cm. longis; lobis calycis majusculis inaequalibus 2-serialibus, inferioris ca. 2 cm. longis superioris 1.2–1.5 cm. longis, virido-flavibus; folliculis ignotis.—Colombia, Turbaco, Bolivar. Shrubby vine, thin loam over white rock, alt. 150–200 m., March 27, 1918, *Pennell 4755* (Gray Herb. TYPE).

Distribution: southern Mexico and northern Colombia.

Specimens examined:

MEXICO:

GUERRERO: Achatla, May, 1926, *Reko 4892* (US).

COLOMBIA: Turbaco, Bolivar. Shrubby vine. Thin loam over white rock, alt. 150–200 m., March 27, 1918, *Pennell 4755* (G TYPE, US, F, MBG).

This species, although closely related to *S. grandiflora*, is very distinctive, not only because of the strikingly unequal calyx-lobes, but because of the rufous puberulence of the leaves. The flowers, also, appear to be more turbinate in the reflexion of the corolla-lobes than any other species of *Ochrodaphne*, but this character has not been noted because most of the specimens of that subgenus are so poorly pressed, and Dr. Pennell's are so carefully prepared, that use of this character would be dangerous. The species is dedicated to Dr. Francis W. Pennell, of the Academy of Natural Sciences of Philadelphia, the collector of the type specimen.

13. Stemmadenia eubracteata Woodson, n. sp.[1] Pl. 49, fig. 2.

Shrubs or small trees; leaves 6–8 cm. long, 2–3 cm. broad, glabrous, petiolate, the petioles 4–5 mm. long; inflorescence 2–5-flowered; corolla salverform, yellow, the tube about 2.5 cm. long, the limb about 1.5 cm. broad; calyx-lobes 3–4 mm. broad, 8–10 mm. long, all green, spreading; bracts semifoliaceous; follicles unknown.

Distribution: known only from the type locality in Guatemala.

Specimens examined:

GUATEMALA: Volcan Tecuamburro, Dept. Santa Rosa, alt. 2000 m., Feb. 1893, *Heyde & Lux 4538* (G TYPE).

This species is one of the most remarkable species of *Ochrodaphne* by reason of the spreading calyx, the narrow leaves, and above all the curiously foliaceous bracts, which are absolutely different from those of any other species of the genus *Stemmadenia*.

[1] **Stemmadenia eubracteata** sp. nov., arborea; foliis lanceolatis 6–8 cm. longis 2–3 cm. latis glabris, petiolis 4–5 mm. longis; corollae tubo salverformo 2.5 cm. longo, lobis ca. 1.5 cm. longis; lobis calycis 3–4 mm. latis 8–10 mm. longis; bracteis semifoliaceis; folliculis ignotis.—Guatemala, Volcan Tecuamburro, Dept. Santa Rosa, alt. 2000 m., Feb., 1893, *Heyde & Lux 4538* (Gray Herb. TYPE).

14. Stemmadenia Robinsonii Woodson, n. sp.[1]

Shrubs or small trees; leaves 12–16 cm. long, 4–5 cm. broad, glabrous, petiolate, the petioles 1–3 mm. long; inflorescence 2–3-flowered; corolla salverform, yellow, the tube 2–2.5 cm. long, the limb about 1–1.5 cm. broad; calyx-lobes linear-lanceolate, 1.5–2 cm. long, 3–4 mm. broad, very slightly imbricated in two unequal series, both series yellow, appressed; follicles unknown.

Distribution: known only from the type locality in Costa Rica.

Specimens examined:

COSTA RICA: Talamanca Mts., March, 1894, *Pittier 8617* (US TYPE).

This species is dedicated to Dr. B. L. Robinson, who, in 1899, questioned its determination as *S. bella* Miers, and called attention in a note upon the specimen to the peculiar calyx, which is the most striking characteristic of the species. In addition to the calyx, *S. Robinsonii* differs from its nearest relative, *S. Donnell-Smithii*, in the leaves, which are glabrous and oblong-lanceolate in the former, and spatulate and barbate in the latter.

15. Stemmadenia Donnell-Smithii (Rose) Woodson, n. comb.

Tabernaemontana Donnell-Smithii Rose, Bot. Gaz. **18**: 206. 1893.

Tabernaemontana Donnell-Smithii Rose var. *costaricensis* Donn.-Sm. Bot. Gaz. **24**: 397. 1897.

Shrubs or small trees; leaves 6–8 cm. long, 3–3.5 cm. broad, spatulate, minutely glandular-puberulent or glabrate above, beneath conspicuously barbate in the axils of the midvein, petiolate, the petioles 1–2 mm. long; inflorescence 1–4-flowered; corolla yellow, salverform, the tube 2.5–3 cm. long, the limb 1.5–2 cm. long; calyx nearly equalling the length of the corolla-tube, 2–2.5 cm. long, the lobes 1.5–2 cm. broad, in two closely imbricated yellowish series; follicles about 3.5 cm. long, about 3 cm. broad, rounded at the apex.

[1] **Stemmadenia Robinsonii** sp. nov., arborea glabra; foliis oblongo-lanceolatis 12–16 cm. longis 4–5 cm. latis, petiolis 1–3 mm. longis; corollae tubo salverformo 2–2.5 cm. longo, lobis 1–1.5 cm. longis; lobis calycis linearo-lanceolatis 1.5–2 cm. longis 3–4 mm. latis; folliculis ignotis.—Costa Rica, Talamanca Mts., March, 1894, *Pittier 8617* (US TYPE).

Distribution: tropical forests, southern Mexico and Central America.

Specimens examined:

MEXICO: locality and date lacking, *Gregg 893* (MBG).

GUERRERO: La Correa, Oct. 5, 1898, *Langlassé 427* (G, US).

COSTA RICA: Nicoya, April, 1900, *Tonduz 13904* (G, NY); Santa Clara, Sept. 1896, *Cooper 10241* (US); Matambú, Nicoya Peninsula, May 23, 1903, *Cook & Doyle 706* (US); Nicoya, alt. 200 m., May 22, 1903, *Cook & Doyle 686* (US); Nicoya, forests, *Tonduz 13904* (US); Capulín, on the Rio Grande de Taracales, Prov. Alojuela, April 2, 1924, *Standley 40220* (US); Arenal, May 5, 1922, *Valerio 86* (US).

BRITISH HONDURAS: Middlesex, Jan. 17, 1926, *Ricard 13* (US).

HONDURAS: Ceiba, Aug. 20, 1916, *Dyer A84* (US).

NICARAGUA: Las Nubes, June 28, 1923, *Maxon, Harvey & Valentine 7502* (US).

GUATEMALA: St. Thomas, May 29, 1909, *Deam 6052* (G); Escuintla, alt. 1100 ft., March, 1890, *Donnell-Smith 2404* (G); San Felipe, Dept. Retalhulen, alt. 2050 ft., April, 1892, *Donnell-Smith 2763* (G, US TYPE, NY, F, MBG); Barranca de Eminencia, Dept. Amatitlan, alt. 1400 ft., Feb. 1892, *Donnell-Smith 2762* (G, NY, MBG); Escoba, June 2, 1922, *Standley 2462* (US); Hacienda el Baul, Dept. Escuintla, March 2, 1921, *Tonduz & Rojas 36* (US); Santa Lucia, Escuintla, March 2, 1905, *Kellerman 5286 & 5275* (US); Mazatenango, border of forest, Feb. 19, 1905, *Maxon & Hay 3490* (US); San Jose de Escuintla, April, 1892, *Donnell-Smith 2765* (US); San Juan Mixtan, April, 1890, *Donnell-Smith 2405* (US); Primavera, Dept. Sololá, Oct. 1891, *Shannon 120* (US); Rio Toro Amarillo, Llanuras de Santa Clara, April, 1896, *Donnell-Smith 6646* (US TYPE var. *costaricensis*); Santa Barbara, Dept. Sololá, Aug. 1891, *Shannon 152* (US); Naranjo, Dept. Escuintla, March, 1892, *Donnell-Smith 2764* (US).

EL SALVADOR: vicinity of San Salvador, alt. 650–850 m., Dec. 20, 1921–Jan. 4, 1922, *Standley 19187* (US, G, NY); vicinity of Izalco, Dept. Sonsonate, March 19–24, 1922, *Standley 21865* (G, US); same locality and date, *Standley 22218* (G, NY, US); vicinity of Ixtepeque, Dept. San Vicente, alt. 400 m.,

March 6, 1922, *Standley 21463* (G, US); San Salvador, 1921, *Calderon 187* (NY, US); San Salvador, 1900, *Renson 106* (US); Armenia, Dept. Sonsonate, April 18, 1922, *Standley 23452* (US); Dept. Ahuachapán, 1923, *Padilla 331* (US); Izalco, Dept. Sonsonate, Feb. 17, 1907, *Pittier 1936* (US).

In referring this species to the genus *Tabernaemontana*, Dr. Rose[1] was fully cognizant of its affinities, and especially of its relation to *Stemmadenia grandiflora*, but preferred to assign it to the former genus, remarking "*T. grandiflora*, as is known, was referred by Miers to *Stemmadenia*, but is retained by Mr. Hemsley in *Tabernaemontana*. The difference between these two genera is sometimes a little difficult to determine." Dr. Rose further added an interesting note concerning the species: "Capt. Smith observes of this plant: 'It is not exactly a tree in habit. It occurred everywhere as I went from the coast up to the slopes of the volcanoes at an elevation of 5,000 ft. The natives call it *Cobal* (varnish gum).' Other popular names for the species are 'Cojón' and 'Cojón de puerco.'"

The observations of Dr. Rose quoted above are representative of the attitude with which the majority of botanists have regarded the genus *Stemmadenia*. This paper will be successful if merely it demonstrates the numerous precise differences between the genera *Tabernaemontana* and *Stemmadenia*.

Excluded Species

Stemmadenia guatemalensis Müll.-Arg. Linnaea **30**: 410. 1859. = **Malouetia guatemalensis** (Müll.-Arg.) Standl. Jour. Wash. Acad. Sci. **15**: 459. 1925. (*Malouetia panamensis* Müll.-Arg. in Van Heurck, Pl. Nov. 185. 1871.)

List of Exsiccatae Cited

The distribution numbers are printed in *italics;* collections distributed without numbers are indicated by a dash. The numbers in parentheses indicate the species numbers in the present revision.

Baker, C. F. *2270* (4).
Bilimek, —, *269* (7).
Botteri, M. *988* (7).
Bourgeau, M. *2440* (7).
Brenes, A. M. *14275*, *14278* (6).
Calderón, S. *1230* (4); *187* (15).
Chaves, D. *215* (4).
Conzatti, C. & Reko, B. P. *3258* (4a).
Conzatti, C., Reko, B. P. & Makrinius, M. *3172* (9).
Cook, O. F. & Doyle, C. B. *723* (4a); *120*, *152*, *706*, *686* (15).

[1] Rose, Bot. Gaz. **18**: 206. 1893.

Cooper, G. P. *10241* (15).
Cooper, G. P. & Slater, G. M. *63a* (10).
Curran, H. M. *12* (10).
Curran, H. M. & Haman, S. *971* (10).
Deam, C. *6070* (4a); *6052* (15).
Donnell-Smith, J. *1800* (7); *2404*, *2405*, *2762*, *2763*, *2764*, *2765*, *6646* (15).
Duchassaing, E. P. —, (10).
Dyer, F. J. *A84* (15).
Fendler, A. *1027* (10).
Galeotti, H. *1599*, *1605* (7).
Gaumer, G. F. *23204* (7).
Goldman, E. A. *358* (1a); *1027* (4a); *575* (7).
Gregg, J. *893* (15).
Greenman, J. M. & Greenman, M. T. *5713*, *5920* (4a).
Hartmann, C. V. *534*, *1032* (1a).
Hayes, S. — (3).
Heilprin, A. & Baker, C. F. — (1).
Heriberto, Bro. *209*, *461*, *249* (10).
Heyde, E. T. & Lux, —, *4538* (13).
Jahn, A. *336*, *1280* (10).
Jones, M. E. *335* (1a).
Kappler, A. *1565* (11).
Kellerman, W. A. *4511* (4a); *5286*, *5275* (15).
Kenoyer, L. A. *500* (10).
Lamb, F. H. *467* (2).
Langlassé, E. *1029* (4); *427* (15).
Macbride, J. F. *2798*, *2799* (10).
Maxon, W. R. *7647*, *7727* (3).
Maxon, W. R. & Harvey, A. D. *6599*, *6646*, *6751* (10).
Maxon, W. R., Harvey, A. D. & Valentine, A. T. *7270*, *7539* (3); *7542* (4); *6948*, *7084*, *7502* (10).
Maxon, W. R. & Hay, R. *3766* (4a); *3490* (15).
Maxon, W. R. & Valentine, A. T. *6948* (10).
Mell, C. D. *28* (4a).
Mexia, Y. *733*, *1490* (1a).
Mille, L. *59* (4a).
Millspaugh, C. F. *27* (7).
Montes, M. N. & Salazar, A. E. *405*, *268* (1a).
Ortega, J. G. *4175* (1a).
Padilla, S. A. *331* (15).
Palmer, E. *M*. (1a); *132*, *1470* (1a).
Pennell, F. W. *4755* (12).
Pennell, F. W. & Rusby, H. H. *186* (11).
Pittier, H. *1177* (4); *133*, *2908* (4a); *11094* (5); *11*, *1594*, *2824*, *3388*, *3739*, *3940*, *4406*, *4748*, *5011*, *6355*, *7774*, *10288*, *10516* (10); *8617* (14); *1936* (15).
Popenoe, W. *977* (4a).
Pringle, C. G. *4370* (1); *5151*, *5363*, *6847*, *6872* (1a); *8103* (7).
Purpus, C. A. *6230*, *8771* (4a); *7740* (7).
Reko, B. P. *4892* (12).
René, A. *78* (9).
Renson, C. *106* (15).
Ricard, B. H. *13* (15).
Robinson, A. & Lyon, M. W., Jr. — (10).
Rose, J. N. *1573*, *1688*, *2888*, *3260* (1a); —, *1614* (9); —, *1711* (10).
Rose, J. N. & Hough, W. *4777* (1a).
Rose, J. N., Painter, J. H. & Rose, J. S. *9274* (4a).
Rose, J. N. & Rose, G. *23612* (4a).
Rose, J. N., Standley, P. C. & Russell, P. G. *13874* (1); *14064*, *14544*, *14675* (1a); *14484* (10).
Rusby, H. H. *931*, *1163* (4a).
Samuels, J. A. —, *384*, *385* (10).
Schott, A. *430* (7).
Seler, C. *3436* (1a).
Shannon, W. C. *5042* (4a); *120*, *152* (15).
Smith, C. L. —, (3); *126*, *1339*, *1374* (4a).
Smith, H. H. *1639* (10).
Standley, P. C. *20686*, *20713*, *20943*, *32793*, *35459* (3); *21034* (4); *22372*, *22539* (4a); *28840*, *40994* (10); *19187*, *21463*, *21865*, *22218*, *23452*, *2462*, *40220*, *40994* (15).
Stevens, F. L. *90* (10).
Tejera, E. *14* (10).
Tonduz, A. *13900* (4a); *17653* (5); *13904* (15).
Tonduz, A. & Rojas, A. *147* (7); *17653* (10); *36* (15).
Tuerckheim, H. von. *981* (7).
Valerio, J. *86* (15).
Weigelt, C. — (10).
Williams, R. S. *803* (10).

Index to Species

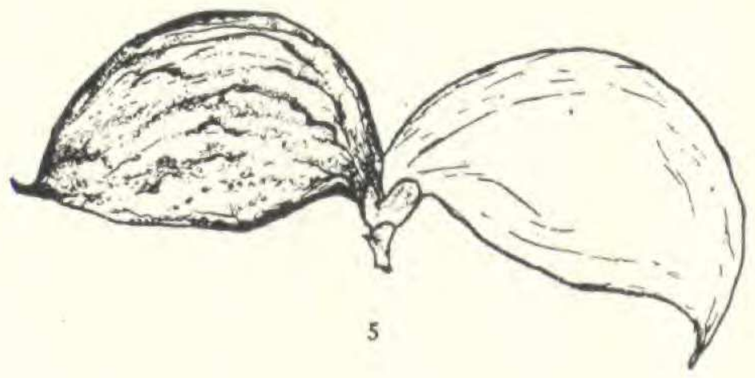
New subgenera, sections, species, varieties, and combinations are printed in **bold face** type; synonyms in *italics;* and previously published names in ordinary type.

Explanation of Plate

PLATE 47

Fig. 1. Habit of *Stemmadenia glabra*. × ½.
Fig. 2. Habit of *Stemmadenia Galeottiana*. × ½.
Fig. 3. Detail of floral mechanism of *Stemmadenia Galeottiana*. × 2.
Fig. 4. Habit of *Stemmadenia grandiflora*.× ½.
Fig. 5. Fruit of *Stemmadenia tomentosa* var. *Palmeri*. × ½.

1



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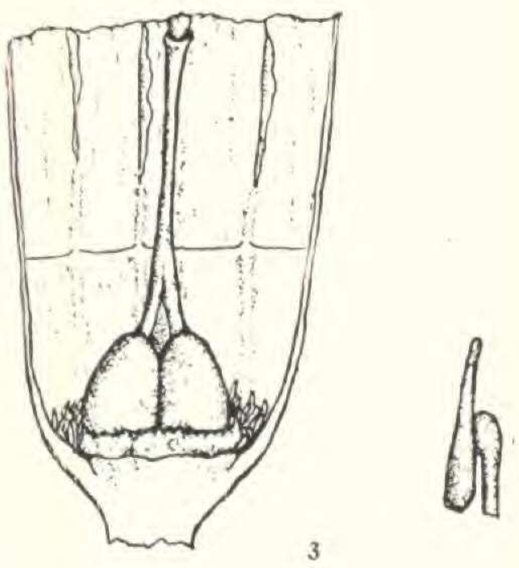

3

4

EXPLANATION OF PLATE

PLATE 48

Fig. 1. *Stemmadenia sinaloana* Woodson, from the type specimen, *F. H. Lamb No. 467*, in the Gray Herbarium of Harvard University.

Fig. 2. *Stemmadenia Greenmanii* Woodson, from the type specimen, *Brenes 14275*, in the Gray Herbarium of Harvard University.

1

2

EXPLANATION OF PLATE

PLATE 49

Fig. 1. *Stemmadenia pauciflora* Woodson, from the type specimen, *Pennell & Rusby No. 186*, in the Herbarium of the New York Botanical Garden.

Fig. 2. *Stemmadenia eubracteata* Woodson, from the type specimen, *Heyde & Lux No. 4538*, in the Gray Herbarium of Harvard University.